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| 10/721,628 | 11/25/2003 | Farhan A. Baqai | 50T5611.01/1672 | 7723 |

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| EXAMINER | |
|---|---|
| CHEN, WENPENG | |
| **ART UNIT** | **PAPER NUMBER** |
| 2624 | |

DATE MAILED: 07/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/721,628 | BAQAI ET AL. | |
| | Examiner | Art Unit | |
| | Wenpeng Chen | 2624 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-42 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-7,10-13,16-27,30-33 and 36-42 is/are rejected.

7)☒ Claim(s) 8-9, 14-15, 28-29, and 34-35 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 November 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 1/16/04.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 21, and 41-42 are rejected under 35 U.S.C. 102(b) as being anticipated by Alston et al. (US patent 5,850,472.)

Alston teaches a system for effectively performing an image data transformation procedure, comprising:

-- as recited in Claim 1, an electronic camera device configured to capture primary image data corresponding to a photographic target; (column 4, lines 52-67; column 11, line 32 to column 12, line 28; RGB being the primary image data)

-- as recited in Claim 1, a transformation manager configured to convert said primary image data into secondary image data by utilizing transformation parameters that are optimized to minimize noise characteristics in said secondary image data; (column 11, line 32 to column 12, line 28; the equation in column 11, lines 47-52 being the noise in the XYZ secondary image data space)

Evidently, Alston also teaches the method of Claim 21 and system of Claim 42 which correspond to the system of Claims 1.

Alston further teaches a computer-readable medium comprising program instructions for performing an image data transformation procedure recited in Claim 41. (column 5, lines 7-36; column 17, lines 29-45)

3. Claims 1, 16-20, 21, and 36-41 are rejected under 35 U.S.C. 102(b) as being anticipated by Spaulding et al. (US patent 5,805,213.)

Spaulding teaches a system for effectively performing an image data transformation procedure, comprising:

-- as recited in Claim 1, an electronic camera device configured to capture primary image data corresponding to a photographic target; (column 9, line 5 to column 10, line 9; RGB being the primary image data)

-- as recited in Claim 1, a transformation manager configured to convert said primary image data into secondary image data by utilizing transformation parameters that are optimized to minimize noise characteristics in said secondary image data; (column 9, line 5 to column 10, line 9; $R_cG_cB_c$ being the second image data)

-- as recited in Claim 16, wherein said transformation parameters are selected in an off-line design procedure in which transformation parameter limits are defined, and an optimization metric is defined for evaluating representative color patches from a patch set; (column 4, lines 1-10; column 9, line 5 to column 10, line 9; The row-sum of the matrix is required to be 1. The optimization is done off-line.)

-- as recited in Claim 17, wherein an optimization metric is minimized for a series of desired illuminants of said representative color patches and camera gains to thereby determine which of said transformation parameters are optimal for minimizing said noise characteristics in said secondary image

data; (column 9, line 5 to column 10, line 9; column 10, lines 30-62; The optimization is done related to the camera gain through the gain factors.)

-- as recited in Claim 18, wherein said transformation parameters are utilized to create parameter lookup tables in said camera device for performing said image data transformation procedure; (column 9, lines 5-24; 3-D LUT are used for color transformation.)

-- as recited in Claim 19, wherein said camera device measures and records a current camera gain and a current illuminant corresponding to a photographic target; (column 9, lines 5-24; column 10, lines 30-62; Illuminant is determined. Gain factors are included in the optimization process.)

-- as recited in Claim 20, wherein said transformation manager accesses parameter lookup tables of said transformation parameters, said transformation manager interpolating appropriate ones of said transformation parameters depending upon said current camera gain and said current illuminant, said transformation manager then performing said image data transformation procedure with said appropriate ones of said transformation parameters to produce said secondary image data. (Fig. 3; column 6, line 25-55)

Evidently, Spaulding also teaches the methods of Claims 21, 36-40 and the system of Claim 41 which correspond to the systems of Claims 1, 16-20.

## *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 2-7, 10, 13, 22-27, 30, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spaulding et al. (US patent 5,805,213) as applied to Claims 1 and 21, and further in view of Kim (US patent 6,049,626.)

Spaulding teaches the parent Claims 1 and 21 in which optimization of color transformation as recited is achieved in device-dependent color space to device-dependent color space. Spaulding further teaches:

-- that optimization of color transformation can be performed from device-dependent color space RGB to device-dependent color space XYZ. (column 2, lines 1-45)

-- as recited in Claims 4-5, the row-sum of the matrix is required to be 1. (column 4, lines 1-10; The row-sum of the matrix is required to be 1.)

However, it does not teach the features related to YCbCr recited in Claims 2 and 22 and additional features recited to their dependent claims.

Kim teaches color transformation from device-dependent color space RGB to device-dependent color space YUV that is defined in CCIR-601, in which YUV is also called YCbCr comprising;

-- as recited in Claim 2, color transformation from device-dependent color space RGB to device-dependent color space YUV that is defined in CCIR-601, in which YUV is also called YCbCr. (column 6, line 1-15)

It is desirable to extend optimization of color transformation to as many pair color spaces as possible to broaden its application. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply Spaulding's teaching to optimize the RGB-YCbCr transformation, because the combination broadens the application of the optimization process.)

The combination also teach the followings that are recited in dependent claims of Claims 2 and 22:

-- as recited in Claim 3, wherein said transformation manager performs said image data transformation procedure by utilizing said transformation parameters that include a first transformation parameter "k1", a second transformation parameter "k2", and a combination parameter "k3"; (Kim in column 8, lines 10-27 further teaches that the (R' , G', B') finally used for transformation include a first values (R , G, B) and another luma value Max. They are combined with weight to form (R', G', B') for transformation. So $Y = A (a_{11}R + a_{12}G + a_{13}B) + K$. In the equation, $k1=a_{11}$, $k2=a_{12}$, $k3=K/Max=(k-1)\alpha/(k-1)$. Furthermore, Spaulding in column 4, lines 1-10 requires that $(a_{11} + a_{12} + a_{13}) = 1$.)

-- as recited in Claim 4, wherein said transformation manager utilizes a transformation matrix to perform said image data transformation procedure, said transformation matrix having a luminance transformation row that includes said first transformation parameter "k1", said second transformation parameter "k2", and a third transformation parameter that is equal to 1 minus said first transformation parameter "k1" minus said second transformation parameter "k2"; ( Spaulding in column 4, lines 1-10 requires that $(a_{11} + a_{12} + a_{13}) = 1$.)

-- as recited in Claim 5, wherein said transformation manager calculates a first luminance value "Y1" according the a formula: Y1=(k1)R+(k2)G+(1-k1-k2)B where "R", "G", and "B" are respective red, green, and blue color primary values from said primary image data, "k1" is said first transformation parameter, "k2" is said second transformation parameter, and (1-k1-k2) is a third transformation parameter from said luminance transformation row of said transformation matrix; (Spaulding in column 4, lines 1-10 requires that ($a_{11}$ +$a_{12}$ + $a_{13}$) =1.)

-- as recited in Claim 6, wherein said transformation parameters are optimized by evaluating an optimization metric; (Spaulding in column 9, line 24 to column 10, line 9; The combination of Spaulding and Kim teaches replace $R_cG_cB_c$ with YUV (YCbCr).)

-- as recited in Claim 7, wherein said optimization metric is evaluated in a linear L*a*b* color space to minimize said noise characteristics in said secondary image data; (Spaulding in column 9, line 24 to column 10, line 9)

-- as recited in Claim 10, wherein said combination parameter "k3" is utilized to determine a combination ratio for combining said first luminance value "Y1" and a second luminance value "Y2" to produce a final luminance value "Y" for said secondary image data in said YCbCr format; (Kim in column 8, lines 10-27 further teaches that the (R' , G', B') finally used for transformation include a first values (R , G, B) and another luma value Max. They are combined with weight to form (R' , G', B') for transformation. So Y = A ($a_{11}$R +$a_{12}$G + $a_{13}$B) +K. In the equation, k1=$a_{11}$, k2=$a_{12}$, k3=K/Max=(k-1)$\alpha$/(k-1). Y1 = ($a_{11}$R +$a_{12}$G + $a_{13}$B) . Y2 = Max.))

-- as recited in Claim 13, wherein said transformation parameters are optimized and stored in parameter lookup tables in said camera device for each illuminant at each camera gain; (column 9, lines 5-

24; 3-D LUT are used for color transformation. column 9, lines 5-24; column 10, lines 30-62; Illuminant is determined. Gain factors are included in the optimization process.)

Evidently, the combination of Spaulding and Kim also teaches the methods of Claims 22-27, 30, and 33 which correspond to the systems of Claims 2-7, 10, and 13.

6. Claims 11-12 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spaulding et al. (US patent 5,805,213) and Kim (US patent 6,049,626) as applied to Claims 10 and 30, and further in view of Fields (US patent 6,505,002.)

The combination of Spaulding et al. (US patent 5,805,213) and Kim (US patent 6,049,626) as discussed above teaches parent Claims 10 and 30.

Kim further teaches:

-- as recited in Claim 12, wherein said transformation manager calculates said final luminance value "Y" by applying a formula: $Y=(k3)Y1+(1-k3)Y2$ where "Y1" is the said first luminance value calculated using said transformation matrix, "Y2" is said second luminance value, and "k3" is said combination parameter. (Kim in column 8, lines 10-27 further teaches that $A + k3= 1$, where $A= k(1-\alpha)/(k-1)$ and $k3=(k-1)\alpha/(k-1)$.

However, the combination does not teach the feature related to that the second luminance value "Y2" is a simple unprocessed average. Kim further teaches

Fields teaches color processing approach comprising:

-- as related to Claim 11, a maximum luminance is derived from unprocessed average of selected primary color values from primary image data. (column 31, lines 27-52)

It is desirable to have flexibility of selecting various maximum values for preventing color saturation. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to use Fields' average value as the Max of Kim in color transformation because the combination improves process flexibility. The overall combination thus teaches:

- as recited in Claim 11, wherein said second luminance value "Y2" is a simple unprocessed average of selected primary color values from said primary image data.

***Allowable Subject Matter***

7. Claims 8-9, 14-15, 28-29, and 34-35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter. The prior art fails to teach the system of Claim 8 and the method of Claim 28 which specifically comprises:

-- wherein standard noise deviations above and below an average L* value are calculated for each color patch from a representative patch set, said standard noise deviations being utilized to calculate noise variance values for each of said color patches according to a formula:

$NV=(SND)^2$

where SND is one of said standard noise deviations, and NV is a corresponding one of said noise variance values used to calculate said optimization metric.

The prior art fails to teach the system of Claim 15 and the method of Claim 35 which specifically comprises:

-- wherein said transformation parameters are restricted by parameter limits in which said first transformation parameter "k1" is limited according to a first formula: $0 \leq k1 \leq 1$, said second transformation parameter "k2" is limited according to a second formula: $0 \leq k2 \leq 1$, said third transformation parameter (1-k1-k2) is limited according a third formula: $0 \leq (1-k1-k2) \leq 1$ , and said combination transformation parameter "k3" is limited according to a fourth formula: $0 \leq k3 \leq 2$.

The prior art fails to teach the system of Claim 14 and the method of Claim 34 which specifically comprises:

-- wherein said parameter lookup tables are implemented in a minimized format with a reduced number of said transformation parameters, said transformation manager utilizing interpolation techniques to interpolate additional transformation parameters for certain of said camera gains and said illuminants that are not specifically listed in said parameter lookup tables.

***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wenpeng Chen whose telephone number is 571-272-7431. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-7453. The fax phone numbers for the organization where this application or proceeding is assigned are 571-273-8300 for regular

communications and 571-273-8300 for After Final communications. TC 2600's customer service number is 571-272-2600.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Wenpeng Chen
Primary Examiner
Art Unit 2624

June 27, 2006